SNOWBOARD BINDING

Field of Invention

This invention relates to a snowboard binding. More particularly, this invention relates to a snowboard binding with better facility for adjustment of foot orientation on the snowboard, and improved means for attachment and removal of the binding.

Background Art

The following description of the prior art is not intended to be, nor should it be interpreted as, statements or admissions of the common general knowledge in the art in Australia.

Descriptions of recent developments in boot binding systems for snowboards may be found in US 5,261,689, US 5,356,170 and US 5,722,680 (Dodge, et al). These documents disclose a boot binding with a base to be supported on a snowboard. The base includes a circular opening in its centre which receives a disk shaped base plate. The base or hold-down plate may be secured to the board in several different positions on the board with the binding base assuming any position by rotation with respect to the hold-down plate. The hold-down plate is secured by screws received in holes in the board. This presents a problem in the various situations, sometimes unpredictable, when a user needs to adjust the orientation of the boot binding. This most obviously occurs preparatory to the user mounting a chairlift where the orientation of the boot binding would, if possible, be desirably changed to enable the user to sit comfortably and safely on the chairlift. Once the user alights from the chairlift, the boot binding would desirably once again be adjusted to the orientation desired for snowboarding. However, this does not happen in practice because of the difficulty involved in such adjustments. The snowboarder must resign herself to travelling on the chairlift in an awkward position because adjustment is not possible. Another example where the difficulty of adjustment of the orientation of the boot binding presents itself is where the user desires to skate along. Such situations may arise where the slope is insufficiently steep to enable down-hill snowboarding or a shallow incline must be traversed to get to the next slope. Casual users who hire snowboarding gear from a ski hire store are generally required to decide on their feet positions before they even get on the ski slopes. Normally an experienced operator will adjust the boot bindings on the casual user's behalf. If the casual user discovers that a slightly or even radically different orientation would be more comfortable or may even prevent injury, the casual user has little option but to persist with the binding orientations set by the hire store operator. Even if a screwdriver

is available on the slopes, ski hire equipment may be difficult to adjust due wear-related burring of the screws, nuts or bolts used to secure the base plate.

There is therefore a need for a binding which enables easy adjustment, attachment or removal by novice and experienced users alike on the ski slopes.

It is therefore an object of the invention to overcome the aforementioned disadvantages of the prior art or, at least, to provide a useful alternative thereto.

Statement of Invention

In one aspect, the invention provides a snowboard binding including:

(a) a binding base having a front end and a rear end;

(b) an aperture in said binding base intermediate said front and rear ends for receiving a snowboard engaging member adapted to releasably secure said binding base to the snowboard, the perimeter of said aperture including at least one pair of adjacent points adapted for relative movement; and

(c) separation means to selectively space said adjacent points to loosen said binding base from said board engaging member to enable said binding base to be moved relative to said board engaging means.

The adjacent points may be spaced relative to one another on the perimeter of the aperture. The adjacent points may be spaced a certain distance in a first fixed position and spaced a different distance in a second adjustment or removal position. The spacing between the adjacent points may be capable of being varied by the operation of an actuator operable to move the adjacent points relative to one another, such as when the spaced points are in the second position compared to the first position.

The snowboard is typically substantially planar and elongate with rounded, upturned ends. In plan view, different snowboards will vary in diameter and a particular snowboard may be slightly wider in diameter at its respective ends. The snowboard may include a range of holes for receiving the boot binding at any one of a number of longitudinal positions along the length of the snowboard. Typically, of course, the snowboard will have provision for a pair of boot bindings corresponding to a user's right and left feet.

The binding may further include lateral side supports to support the instep and outstep of a boot. The side supports may extend substantially vertically from the base and may generally follow the contour of a typical snowboarding boot. The side supports may include engagement means for securing the boot to the binding. The boot engagement means may include simple a strap/buckle arrangement or deflectable flanges which

releasably engage a corresponding shoulder of the boot on one or both of the instep or the outstep of the boot. The engagement means may be easily releasable by actuation of a lever which may be operably connected to the engagement means. In a preferred form, the boot engagement means may comprise step-in engagement means including opposed rotatably deflectable flanges for engaging the sole rim of the boot on the instep and outstep, respectively. In this way the flange in each case rides over the sole rim and locks above the sole rim thereby securing the boot in the binding. The boot is preferably held in place in the binding by strong spring biasing whereupon, on application of sufficient twisting or other exiting force having the requisite inertia, the boot is releasable from the engagement means to reduce the risk of injury.

The binding may also include a heel support such as an elongate semi-cylindrical plate extending up from the heel end and optionally adjustably mounted to the side supports or the base. The ankle support may be a rigid, curved bar attached to the side supports or the base. The ankle support may be adjustably mounted so that it is rotatable about vertical and horizontal axes and may be longitudinally slidable along a small portion of the length of the base to accommodate a wide variety of boot shapes and sizes and personal user preferences.

The aperture may be variously shaped whereby to accommodate at least two binding orientations in co-operation with the board engaging member. For example, the aperture may comprise one or more intersecting slots adapted to cooperate with the board engaging member. The aperture may be rectangular, four or more point star-shaped, polygonal etc. Preferably, the aperture is circular. The face or edge of the aperture may be padded for friction grip or may include protrusions or teeth to grip the snowboard engaging member.

The function of the board engaging member is to lock the binding in any one of a number of orientations so that the binding is substantially incapable of vertical movement relative to the snowboard and of rotational movement about an axis normal to the plane of the board. Accordingly, the board engaging member and the aperture preferably have complimentary surface shapes and features which combine to prevent such vertical and rotational movement of the binding relative to the board.

To prevent vertical movement of the binding relative to the board, the base defining the aperture may include one or more horizontally extending features such as one or more flanges or protrusions which are engageable by one or more corresponding horizontally extending features of the board engaging member. Where the board engaging member and the aperture are correspondingly circular, the board engaging member may be rotatable on

insertion, reception or enagagement whereby to lock one or more of its horizontal extending features under a corresponding horizontally extending feature of the binding base. However, preferably the binding base defines a frusto conically shaped aperture having a radially inwardly sloping wall such that the diameter of the aperture on the top surface of the base is wider than the diameter of the aperture in the plane of the underside of the base. The board engaging member may be correspondingly frusto conically shaped whereby its insertion and securement in the aperture prevents vertical movement of the binding relative to the board.

The surface features of the inward facing aperture wall preventing rotation of the binding about a vertical axis relative to the board may include a combination of complementary surface features such as ridges, grooves, corrugations, teeth or the like whereby to permit changes of adjustment by rotation through a wide range in very small increments. The complementary surface features may be included on the base defining the aperture and the board engaging member. Alternatively, the complementary surface features may be on either (1) the base defining the aperture or (2) the board engaging member and the other of these components may include an engagement surface adapted to grip the surface features by having a surface capable of deflection or distortion. For example, one of the board engaging member or the aperture may include a compressible surface, such as plastic, foam or rubber which cooperates with the other surface by high frictional contact to prevent rotation of the binding relative to the board engaging member and the board itself. Alternatively, both the internal wall surface of the aperture and the board engaging member may each include a high frictional surface, such as respective rubber or rubber-like surfaces adapted for mutual frictional engagement.

Preferably, the aperture wall includes at least a portion of teeth or other high friction surface features to which the rim of the board engaging member may engagingly cooperate. The person skilled in the art will of course appreciate that the high friction surface features may equally be found on the board engaging member. The board engaging member preferably includes complementary surface features to ensure positive engagement with the aperture.

However, in an alternative embodiment, the rim of the board engaging member, or at least a portion thereof, may be lined by a compressible surface material, such as a hard, but compressible plastic or rubber material, whereby to provide means for high frictional engagement with the aperture. This compressible surface feature enables an infinite number of rotated potential positions to be adopted by the binding as the compressible surface may

frictionally cooperate with the surface feature of the corresponding component at any point along the compressible material's length.

The board engaging member may be disc shaped. The board engaging member may be generally circular and adapted to co-operate with a generally circular aperture. The board engaging member may include multiple contact surfaces which follow the generally circular periphery of the board engaging member or disc, which contact portions may be variously spaced circumferentially. By providing only a portion of the peripheral surface of the disc for contact with the internal wall surface of the aperture, the amount of surface area contacting the internal wall surface is reduced. The reduction of the contact surface area may facilitate the more efficient and easier relocation of the disc in the aperture. The proportion of contact surface of which the contact portions comprise of the total peripheral surface area of the disc may be varied, depending on the required strength of the engaging connection between the board engaging member and the aperture.

The spaces between the contact portions are preferably filled to resist ingress of snow and ice which may make the apparatus unworkable if compacted ice is permitted to form in the intervening spaces between the contact portions. Accordingly, the contact portions may comprise surfaces which extend slightly proud of the generally circular external surface of the board engaging member. Alternatively, cutout portions may be provided to space the contact portions and reduce the contact surface area. The intervening surface area may be filled by a material different to the hard plastic material of which the board engaging member comprises. For example, the space filler may be a hard or soft rubber or rubber-like material. Preferably, the filler material is in the form of a disc with raised portions to correspond to the cutout portions of the hard disc material of the board engaging member.

The board engaging member may be anchored to the snowboard using a variety of fastening means which the person skilled in the art will readily appreciate. The most common engagement means would include bolt means extending through suitable apertures in the board engaging member adapted to co-operate with a complementary bolt housing anchored in the snowboard. Alternatively, Philip's head bolts are used but these can easily burr through repeated use such as in ski rental shops, so that standard hex bolt heads are preferred (although also subject to wear). The suitable apertures may be arranged in a variety of patterns whereby to ensure strong and preferably symmetrical engagement of the board engaging member with the snowboard. The board engaging member may include

multiple slots adapted to receive such bolts and may be arranged in opposed pairs, triangles, rectangles etc. as required.

The adjacent points may correspond to a partial or continuous gap in a wall defining the aperture. The gap may extend through the base in a generally outward direction relative to the centre of the aperture so that the gap is continuous from the aperture to the outside of the binding base. Alternatively, the gap may not extend fully through the binding base but may be in the form of a V which has an apex at a point intermediate between the aperture and the exterior of the base. In any event, on activation of the separation means there should be sufficient flexibility in the material and construction of the base to permit the adjacent points to be varied to permit the binding to be rotated about a vertical axis without having to release the board engaging member from the board.

Preferably, the adjacent points correspond to opposed edges or points of a continuous gap which extends from the aperture through to the exterior of the binding base. The gap may be simply formed by cutting a top to bottom vertical or inclined slot through the base. If the gap is so formed, it is preferable that the gap be inclined. The gap may be stepped whereby the gap includes opposed horizontal surfaces which are adapted to slide in opposed horizontal directions relative to one another to vary the width of the gap. Preferably, the gap, even in the first closed position, defines a sufficient gap to permit the clearance of snow and ice.

The adjacent points may be at any one of a number of positions on the aperture and may be either directly in front of the toe oriented towards the big toe, oriented towards the small toe, oriented straight back towards the heel, oriented to one side of the heel, or may be directed towards the instep or the outstep of the base. Preferably, the adjacent points and the corresponding gap are located near the big toe in use. The gap may vary in spacing throughout its length. For example, the gap may be narrower at the adjacent points than at opposed points further along the length of the gap. Preferably the gap in the closed position is about 3 to 7mm, preferably 5mm, at the adjacent points and about 5 to 12mm, preferably 9mm, at the opposed points. The opposed points may be at the periphery of the base binding or may be intermediate the aperture and the periphery where the gap is V-shaped. Where the separation extends only part way between the aperture and the periphery of the binding base, the opposed points will be closer than the adjacent points as the separation will be widest, closest to the aperture.

The separation means may operate to vary the space between the adjacent points by space variation means. The space variation means may be provided in a number of different form so that the space variation means is operable to vary the space between the adjacent points, and more particularly in a preferred form, to toggle between a wide open gap corresponding to the second position and a narrow (closed) gap corresponding to the first position.

In a basic form of the invention, the separation means is found in the resilience of the material of the binding base. The binding base may include a substantially planar base plate. The base plate may be connected, preferably integrally formed at least one juncture in its structure, whereby to provide a resilient hinge, the added strength derived by the arch like side and heel supports extending from the sides of the base plate. The operator may simply flex the adjacent points apart to fit the base plate onto the board engaging member whereby the resilience of the material is sufficient to ensure a structurally firm engagement of the base plate to the board engaging member.

The space variation means may be in the form of an over centre or cam mechanism capable of easily being shifted from the first position to the second position to vary the space between the adjacent points. The space variation means may be in the form of a cam having a finger operated lever which is easily manipulated by a user with minimal dexterity, such as may be the case for a user with cold or gloved hands.

The space variation means may include a space variation rod which extends through or above the gap, preferably traversing or intersecting the gap. Where the base plate is made of metal, the material's strength means that the base plate can be made of a thinner construction. In this case, the space variation means may extend across the top of the separation and may be partially housed in tubular cylinder, straps or flanges, co-axially aligned on either side of the separation on the top surface of the base plate. The base plate may be covered with a compressible material such as solid foam rubber to present a substantially flat surface in which the space variation means is embedded. A working end of the space variation rod may be located adjacent a peripheral portion of the base and may be anchored to the binding base at a point on or in the opposed side of the separation. The anchor point may be internal to the binding base or may be located on a peripheral portion of the base. Preferably, the anchor point is located within the binding base structure. The space variation means may extend laterally relative to the general longitudinal orientation of the base plate. The space variation means may extend longitudinally along or through the

base plate. The actuator may be located at the front, side or rear of the base plate, preferably at the side for ease of access.

The snowboard binding may further include reinforcing means extending between the gap or intersecting the adjacent points. The reinforcing means may be in the form of an elongate member . The elongate member is preferably aligned parallel to the space variation means. The elongate member may be in the form of a steel or otherwise rigid material rod. The elongate member may be engaged to the base binding at one end by threaded means or an enlarged head such as a bolt head. The thread may be spiral such that the elongate member is adapted to rotate axially as the adjacent points move relative to one another on operation of the space variation means. Preferably the reinforcing means includes one or more steel cylindrical-section rods. In the case of a thin metal base plate, the reinforcing means may be located above the base plate and adapted to travel or rest in a plurality of channels, flanges, etc. welded or otherwise fixed on the base plate surface. As with the space variation means, the reinforcing means may be embedded in a top base plate surface of compressed foam to present a flat, comfortable top surface to the user.

The reinforcing means may be anchored to the binding base associated with one of the adjacent points and slidable in an axial bore associated with the other of the adjacent points. The reinforcing means may be slidable in coaxial bores associated with opposed said adjacent points, whereby the reinforcing means is slidably trapped within the confines of opposed coaxial bores. The reinforcing means thereby gives the binding base added strength between the adjacent points and/or across the separation.

As described above, the aperture may be circular and the adjacent points opposed across a gap. The movement of the adjacent points relative to one another may include a movement through an arcuate pathway. In this case, the space variation means may be configured to follow a correspondingly arcuate path. For example, the space variation rod may be arcuate or bow shaped to follow the course that one or more of the spaced points are adapted to travel. Furthermore the reinforcing elongate member may also be arcuate in shape along its length. However, for most applications, for practical purposes, the space variation rod and the reinforcing rod are preferably linear to take advantage of availability of components and to minimise manufacturing costs.

The base binding may include a substantially planar plate surrounding the aperture and on which the sole of the snowboard boot directly or indirectly rests in use. The planar plate may include a toe section extending across the front of the planar plate and a heel

section extending across the rear of the planar plate, respectively forward and rearward of the substantially vertical binding side structures. The separation between the adjacent points may involve a variety of binding base configurations. The separation may be in the toe and/or the heel section. The separation may include opposed pairs of adjacent points in the toe and/or the heel section.

The separation may be stepped so that the opposed edges of the planar plate facing one another can contact and/or slide through horizontal planes relative to one another. The planar base footprint may be continuous across the separation whereby the opposed edges overlap with one another, for example where the opposed edges are complementarily stepped. The separation may include complementary engagement portions, such as a tongue and groove or male/female complementary parts. The opposed edges may be complementarily inclined, for example to snugly abut if the separation is closed.

The separation may not extend fully through the toe or heel section, whereby the connected portion of the toe or heel section acts as a hinge. For example, the adjacent points in the toe section may be spaced across a complete separation and a further pair of adjacent points in the heel section may be spaced across a separation which does not extend fully horizontally through the heel section. The separation may include a hinged joint, for example with an axial bolt located in substantially vertical coaxial bores of overlapping portions of the opposed portions of the heel section. In a simple embodiment according to the invention, the rear separation includes a solid hinge formed from a continuous bridge of sufficiently flexible material which may be integrally formed with the heel section, such that the rear separation is formed from an incomplete cut of the heel section.

Where the separation is relatively large and not overlapping, the reinforcing means is preferably incorporated to provide support and rigidity to the structure.

It will be appreciated that, by the operation of the space variation means, the spacing between the actuator and the anchor point may be varied between two or more positions and that, correspondingly, the gap may be widened or narrowed according to the manipulation of the actuator. Alternatively, the space between the actuator and the periphery of the base may be varied, the space between the actuator and the anchor point remaining substantially constant.

To reduce the amount of material used to manufacture the binding including the base, the base may include open portions with strengthening struts in the toe portion of the base. This may be achieved without compromising significantly on the performance of the

base in snowboarding action. Correspondingly, it has been observed by the inventor that the majority of the stress on the binding is through the heel portion and, only to a lesser extent, through the instep and outstep and toe portions. Accordingly, for this reason it is preferred that the adjacent points be located towards the front of the base, such as toward or at the toe area where there are less stress demands on the base and effectively no prospects of structural failure.

Brief description of the drawings

The invention may be better understood from the following non-limiting description of possible and preferred features of one or more of the preferred embodiments of the invention. It is to be understood that the features illustrated and described with reference to the drawings are not to be construed as limiting on the scope of the invention.

In the drawings:

Figures 1a to 2b are front perspective views of snowboard bindings according to various embodiments of the invention showing separations at various locations;

Figures 3 to 6 are front perspective views of snowboard bindings according to further embodiments of the invention;

Figure 7a to 7d are plan views of a board engaging member according to a number of different embodiments of the invention;

Figure 8 is a front perspective view of a snowboard binding according to another embodiment of the invention;

Figure 9 shows a side perspective view of part of a snowboard binding according to a further embodiment of the invention;

Figures 10 to 13 are to plan part sectional views of binding base plates according to further embodiments of the invention;

Figure 14 is a perspective view of space variations means in the form of a cam lever and bolt combination.

Figures 15 to 17 are front perspective views showing surface features of apertures according to further embodiments of the invention;

Figure 18 is a lower perspective view of a board engaging member according to one embodiment of the invention in the form of a disk showing a rim having a continuous frusto conical surface lined with rubber material;

Figures 18 and 19 are front perspective partial views of boot bindings according to further embodiments of the invention showing board engaging members.

Figures 20 to 22 area front perspective partial views of boot bindings according to further embodiments of the invention;

Figure 23 is a plan view of a snowboard showing a pair of boot bindings mounted for orientation in a ride position;

Figure 24 is a plan view of a board with a pair of boot bindings mounted for orientation in the skate or chair lift position;

Figures 25 is a perspective view of an over centre buckle mechanism according to further embodiment of the invention.

Detailed description of the drawings

Referring firstly to Figures 23 and 24, there is shown a snowboard 1 having a typical snowboard footprint to which is mounted, on the top side of the snowboard 1 a pair of boot bindings, namely a left boot binding 2 and right boot binding 3. In Figure 23, the boot bindings 2, 3 are oriented in position for a snowboarder intending to lead with his right foot. In Figure 24, the right boot binding 3 is shown rotated in the direction R to enable the snowboarder to skate on the snowboard 1 and to also enable the snowboarder to mount and alight from a chair lift. The snowboarder is able to adjust the right boot binding 3 (and optionally the left boot binding 2) according to the invention on site on the slopes by easy manipulation a separation means including of an actuator in the form of a over-centre cam lever 4 attached to a bolt anchored to the binding 3. Actuation of the lever 4 lessens the grip of the binding 3 on a board engaging member 5 to enable rotation of the binding 3 about the board engaging member 5 about an axis normal to the plane of the snowboard 1. When the binding 3 has been rotated to its desired orientation, the lever 4 may be flipped back into the closed position, thereby again clamping the binding 3 to the board engaging means 5 and the board 1.

Turning to Figure 14, it can be seen that the lever 4 is rotatably engaged to a rod 6 which has a free threaded end 7 in turn threadably engaged to a bolt house 8. In Figures 9 and 14 the lever 4 is shown in a closed position in which the distance between the lever axis of rotation 9 and a cam surface 10 of the lever 4 is greatest thereby pulling the bolt house 8 close to the cam surface 10. As the lever 4 is rotated clockwise in a direction D (out of the page) the distance between the axis 9 and the cam surface 10 decreases permitting the bolt house 8 to extend further away from the cam surface 10, i.e. to an open position. Accordingly, the lever 4 is operable to correspondingly open and close a gap 22 as will be described in detail with reference to Figure 8 below.

As shown in Figures 10 through to 13, the rod 6 may be variously dimensioned to accommodate different orientations and positions of the space variations means corresponding to the lever 4.

As best shown in Figure 8, the right foot boot binding 3 includes a base 11 having a front toe end 12, a rear heel end 13 and a central circular aperture 14. To support the heel, ankle and calf of the right foot of a user, a heel/calf support 15 extends from the heel end 13 in a substantially vertical direction. The ankle/calf support 15 is substantially internally concave from a top plan perspective whereby to comfortably surround the user's calf and ankle. The ankle/calf support may be adjustably mounted to a pair of side supports, consisting of an outstep side support 16 and an instep side support 17.

The person skilled in the art will appreciate that there are a variety of boot engagement means, such as step-in engagement means straps, buckles, clamps, etc commonly used to secure boots in the fields of snowboarding, roller blading and snow ski boot manufacture equally well adapted to secure the boot to the binding 3. The ankle/calf support 15 is preferably positively adjustable relative to the base 11 or side supports 16, 17, but may be fixed at a comfortable position or angle to accommodate a typical user stance and may optionally provide sufficient flexing at the join between the support 15 and the side supports 16, 17 or the base 11 to provide adequate performance and comfort characteristics. The support 15 and heel end 13 preferably further include padded or cushioned areas 19, 20 for improved user comfort and support.

The toe end 12 may be formed as a solid structure but, more preferably, may include open portions 21 (see Figure 9) to save on materials and decrease the weight of the binding without compromising materially on the strength of the toe end 12.

In Figure 8, intermediate the area corresponding to the big toe and second toe is a gap 22 extending from a pair of adjacent points 23, 24 on the interior wall 25 of the base 11 defining the aperture 14. The gap 22 extends from the adjacent points 23, 24 to an external surface 26 of the toe end 12. Although the binding 3 material is generally strong as well as resilient and is a relatively rigid construction, to strengthen the binding 3 further across the gap 22, advantageously there is provided a reinforcing rod 70 extending across the gap 22 and embedded in substantially co-axial opposed bores in the binding base 11. Of course, the left foot binding 2 will be substantially the mirror image of the right foot binding 3 as described with reference to Figure 8.

In Figures 1a and 1b and Figures 2a and 2b, gaps 27, 28, 29a, 29b are shown in four different optional locations on the base 11. In Figure 1a, a further gap 27a located in the rear portion of the base 11, but the gap 27 does not extend fully through the base 11 to the external surface 26. Instead, it terminates at an intermediate point in the base 11. In such an arrangement, the base 11 material is of sufficient flexibility whereby the release of the lever 4 sufficiently releases the grip of the base 11 on a board engaging member (not shown) received in the aperture 14 to enable the base 11 to be released from the grip of the board engaging member to allow its rotation relative thereto.

In Figure 1b, the gap 28 is shown in the small toe position. In Figure 2a, the gap 29a is shown in the heel position and in Figure 2b the gap 29b is also shown in a slightly different orientation in the heel position similar in principle to gap 27a shown in Fig. 1a..

Advantageously, the gap may be formed in existing boot bindings post-manufacture so that existing stock in, for example, ski hire outlets, can be easily modified to incorporate the invention. Accordingly, the invention may comprise a kit for forming a gap in an existing boot binding and for inserting a space variation means, such as the lever 4 and rod 6 combination and for this purpose may optionally include suitable tools for installation thereof. One method of installing a gap and space variation means according to the invention is to: (1) cut a simple inclined gap 30 as shown in Figure 5; (2) form a recess 31 for accommodating the bolt housing 8 in the body of the base 11 by drilling a suitable bore through the top surface of the base at the position indicated by B; (3) locating the bolt housing 8, correctly oriented, in the recess 31 so formed; (4) drilling an elongate bore 33 from the periphery of the base at the front end instep position 32 through the body of the base 11, the elongate bore 33 intersecting the gap 30 and communicating with the recess 31; and (5) inserting the rod 6 into the elongate bore 33 and threadably engaging the threaded end 7 in the bolt housing 8 by rotating the lever 4 until the rod 6 is securely anchored in the bolt housing 8. The person skilled in the art will appreciate that the recess 31 will need to be located with precision to ensure that the lever 4 is operable to increase and reduce the size of the gap 30 as required.

The gap 30, and indeed all gaps 22, 27, 28, 29a, 29b and 29c are preferably not completely closable even when the lever 4 is in the closed position because it is desirable to maintain sufficient spacing between the opposed surfaces of the gap to enable clearance of ice, sludge and snow.

As shown in Figures 3 and 4, the gap 22 may be stepped to provide better structural stability in the region of the base 11 surrounding the gap. Formation of the stepped gap 22 generally requires specialist machines, such as a laser cutter to achieve a desirably clean cut. The stepped gap 22 includes opposed abutting horizontal surfaces 40 which are adapted to slide relative to one another which, with the added strengthening of the rod 6, are adapted to open and close the gap 22 with minimal distortion or flexing of the base 11 out of its resting plane during use.

In another particularly preferred embodiment shown in Figure 6, a gap 41 may include a tongue and groove configuration which imparts still more flexibility to the gap 41 by virtually eliminating relative vertical movement of the adjacent points 23, 24 through flexing of the base 11 during use. The tongue 42 and corresponding groove is preferably sufficiently deep to ensure that the tongue always remains within the groove whilst permitting sufficient lateral relative displacement of the tongue to the groove. This ensures adequate spacing of the adjacent points for release of the base 11 from the board engaging member. The flexibility of the separation means may be enhanced by providing a hinge in the heel portion 13a of the base 11. The hinge 41a may simply be an internal bridge (as shown in Figures 1a and 2b) or may include a jointed hinge as shown in Figures 3, 4 and 6. The jointed hinge is a nut and bolt extending through co-axial bores vertically formed in overlapping portions of the heel portion 13a. the hinge 41a may be spring (biased) to remove the need for the clamp 4, 4a. Moreover, the integral bridge material 13b shown in Figures 1a and 2b may have sufficient strength and resilience to both act as a hinge and as a biasing means to keep the gap sufficiently closed to hold the binding 3 to the board engaging member 50 in use without the need for the clamp 4, 4a.

Although the aperture 14 is most advantageously circular, the aperture may be formed in a range of different configurations whilst still achieving a boot binding system which provides at least two alternative orientations on the board 1. Accordingly, an aperture may be multi pointed, such as a four point configuration or a six point configuration, or may be polygonal, for example, hexagonal or octagonal. The board engaging member will generally have a shape complementary to that of the aperture.

Correspondingly, as shown in Figures 7(a) to 7(d) the board engaging member 43-46 may be adapted to co-operate with a circular aperture, but the surface area of the board engaging member 43-46 which is in contact with the internal wall surface 25 (see Figure 8) of the aperture 14 may be minimised. The board engaging members 43-46 may comprise

multiple contact regions 51a-d radially spaced about the periphery of the members 43-46. To prevent snow/ice collecting in the spaces 53 between the contact portions 51a-d, the members preferably include rubber or plastic inserts, such as hard or soft rubber or plastic fills 54 as shown in Figure 7c.

The rubber fills 54 are preferably in the form of moulded discs with raised portions corresponding to the spaces 53. The rubber material is similar to that used to cover the binding base 11 top surface, particularly for metal bindings. The board engaging members 43046 include drilled, stamped or cutaway holes corresponding to holes 52 of the disc members 43-46. In each case, the holes 52 of the disc members 43-46 are arranged in a rectangular configuration. However, it will be appreciated that other configurations, such as triangular, pentagonal, or, as a bare minimum, an opposed pair of slots, would provide sufficient anchorage of the members 43-46 to the board 1.

The contact portions 51a-d may include gripping means for positively gripping or engaging the internal wall surface 25, or by providing a frictional engagement means. Accordingly, the contact portions may include complementary teeth, ridges, protrusions, etc., to engage with complementary features on the internal wall surface 25 or may include a resilient rubber or rubber-like material adapted to frictionally engage with a similar material on the internal wall surface 25 or on protrusion features so formed on the surface 25.

As shown in Figures 10-13, the gap can be formed in a variety of locations and the clamp 4 and rod 6 can be located through various axes depending on preferments and ease of access. Because minimal materials are required and because the gap is located in the toe portion 12 in Figure 10, this embodiment is preferred, but the other arrangements shown also perform adequately.

In Figure 12, a lever 4a extends from the periphery of the base at the instep heel area and the associated rod 6a extends laterally into the heel area 13a where the bolt housing 6b is anchored. The rod intersects the gap 29c and is operable to open and close the gap 29c as required by the user's manipulation of the lever 4a Although the location of the gap 29c in Figure 12 performs satisfactorily, it is preferred that the gap 27, 28 be located at the toe end 12 of the binding 3 as the toe end 12 is subject to considerably less stress and load during use than the heel end 13. In any event, the risk of structural failure due to the presence of the gap at any point on the base 11 is very low to the extent that there is no material risk of failure during the normal life of a snowboard boot binding.

Most preferably, the aperture 14 is circular as shown variously in the embodiments of Figures 15-17 and Figures 19 and 20. Preferably, the aperture 14 is, when viewed from a side perspective, frusto conical in shape to permit cooperation with a board engaging member in the form of a complementarily shaped disk 50 shown in Figures 18 to 20. Although the frusto conical configuration is preferred, the person skilled in the art will appreciate that many different configurations are possible which achieve the aim of using the board engaging member to clamp the binding 2, 3 in a particular orientation on the board 1. For example, the board engaging member may have stepped peripheral features or the cooperating structures of the base 11 and the board engaging member may include horizontal opposed structural members which may be rotatable or compressible to effect engagement.

The internal surface of the wall 25 of the aperture 14 may include smooth regions 25a or may include surface features such as cogs, teeth (refer to reference 25b in Figures 17 and 19), ridges, grooves, corrugations protrusions and the like. Preferably, the surface features occupy at least 10% (36°) of a total 360° of a wall 25 defining the aperture 14. Still more preferably, the surface features occupy at least 45° of the total wall 25 arc. Still more preferably, the surface features occupy 90° of the wall 25 arc. The remaining wall 25 surface may be smooth (refer to reference 25a in Figures 17 and 20) , plain and/or unadorned, or may include a resiliently deformable hard plastic or other suitable material such as rubber (synthetic or natural). The surface features may alternatively be located in similar proportions on a complementary engaging wall 51 of the disk 50. The surface of the wall 25 may include no surface features from -45° to +45° at the front toe end. There may be no surface features at the rear heel end of the wall 25 corresponding to positions of -45° to +45°. The wall may include surface features from 270-315° or approximately 9 o'clock to 11 o'clock at the front end of the wall 25. By limiting the proportional area including surface features, the strength of frictional and positive engagement between the wall 25 and surface 51 is moderated and may facilitate the ease of adjustment of the binding 2, 3 by making it easier to loosen the aperture 14 whilst still providing sufficient friction or positive engagement to make the clamping function of the aperture wall 25 effective.

Other alternatives include there being no surface features on the aperture wall 25, no surface features on the plate or disk 50, or no positive engaging surface features on either the plate 50 or the aperture wall 25 provided that the frictional forces acting between the respective surfaces 51, 25 are sufficient. Preferably the wall 25 is provided with a hard but resiliently deformable material to engage surface 51. A complementary hard but resiliently

deformable surface 51 may provide sufficient abutting frictional engagement to render surface features such as teeth, ridges, grooves, sprockets and the like unnecessary. Accordingly, the surface 51 may include an annular rubber washer adapted to be sandwiched between the wall 25 and the disk 50 as shown in Figure 18.

A myriad of effective combinations and alternatives will present themselves to the person skilled in the art. However, the preferred embodiments include a combination of teeth on the wall 25 and a hard rubber material on the surface 51 as shown in Figures 17 and 19 or a hard rubber material on both the wall 25 and surface 51 as shown in Figure 21.

The disk 50 shown in Figure 18 includes a triplet of triangularly arranged slots 52 through which fastening means 52a, such as screws, may be inserted to engage the disk 50 to the board 1 by lining up the slots 52 to corresponding threaded bores (not shown) in the board 1. Whilst it is useful to describe this triangular configuration of slots 52, other engagement configurations and mechanisms will be readily apparent to a person skilled in the art, whereby other fastening means such as clamping means may be used to releasably attach the disk 50 to the board 1 to make sure that the disk 50 is not dislodged during use on the slopes.

Figure 20 shows a binding 103 with a metal base plate 111 and separation means in the form of a clamp104 with an elongate bolt 106. The base plate 111 is too thin for the bolt 106 to be embedded therein and, instead, the bolt 106 rests along the top surface of the base plate 111. The bolt 106 is anchored to the outstep side support 117, whereas the clamp 104 is mounted to the instep side support 116. The top surface of the metal base plate 111 is typically covered with a compressible foam or rubber material and the bolt 106 is embedded therein, so that the bolt is unsighted to the user. The metal material of the base plate 111 is sufficiently resilient to permit the front gap 122a and the rear gap 122b to open upon operation of the lever of clamp 104 to expand the aperture 114 to enable adjustment relative to or removal from or replacement on a board engagement member (not shown). The bridge section 113 is therefore sufficiently flexible and not prone to fatigue through multiple use, particularly as the entire binding structure is strengthened by the side supports 116,117 and ankle backing 115. However, over time and particularly through misuse or application the bridge 113 may eventually weaken. Accordingly, as shown in Figure 21, the binding 103 may further include a hinge 140 so that the two sections 160,161 of the base plate 111 are adapted to pivot about the hinge 140. The hinge 140 may be a band of flexible metal such as

sprung steel looped at each end and secured to vertical pillars or otherwise anchored to the base plate 111.

In Figure 22, a binding 153 is shown which is similar to the arrangement shown in Figure 8, but is without the joint hinge 41a and instead relies on an integral bridge 141 as in the arrangement shown in Figure 20.

Referring to Figure 26, as an alternative to the lever 4 actuator, an overcentre buckle may be used. The overcentre buckle 56 may be any one of a variety of standard overcentre buckle arrangements used to buckle up ski- and snowboarding boots. In Figure 26, the buckle 56 is shown in a closed position in which the lever or finger tab 57 is pressed downward into the buckle body 58 whereby to drag the hook clasp 59 towards the buckle body 58. With reference also to Figure 6, the hook clasp 59 is anchored to the outside toe portion 60 and the buckle body 58 is immovably anchored in the inside toe portion 61 whereby the hook clasp 59 is adapted to straddle the gap 41 when in the closed position. The buckle 56 may be released, whereby to open the gap 41 to permit adjustment of the boot binding 3 relative to the board engaging member (not shown) and the board 1 itself. This is accomplished by lifting the finger tab 57 to enable the buckle end of the hook clasp 59 to ride over an axle 62 to permit the hook end 63 of the hook clasp 59 to permit the widening of the gap 41.

When used in this specification and claims, the terms "comprises" and "comprising" and variations thereof mean that the specified features, steps or integers are included. The terms are not to be interpreted to exclude the presence of other features, steps or components.

It is to be understood that various alterations, modifications and/or additions may be made to the features of the possible and preferred embodiment(s) of the invention as herein described without departing from the spirit and scope of the invention.